

Name: _____

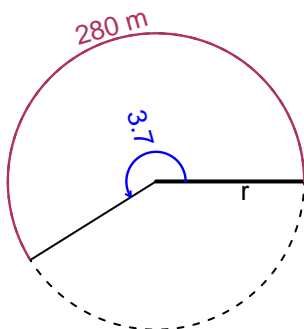
Date: _____

Trig Final (SLTN v645)

- You should have a calculator (like [Desmos](#)) and a [unit-circle](#) reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The angle measure is 3.7 radians. The arc length is 280 meters. How long is the radius in meters?

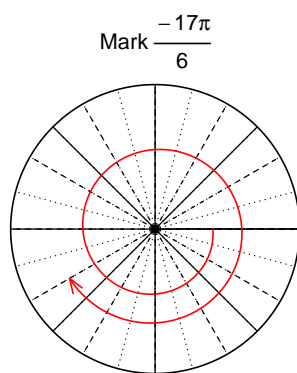


$$\theta = \frac{L}{r} \quad r = \frac{L}{\theta} \quad L = r\theta$$

$r = 75.68$ meters.

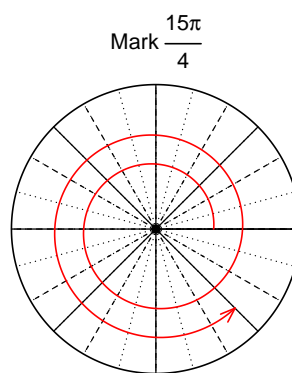
Question 2

Consider angles $-\frac{17\pi}{6}$ and $\frac{15\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(-\frac{17\pi}{6}\right)$ and $\sin\left(\frac{15\pi}{4}\right)$ by using a unit circle (provided separately).



Find $\cos(-17\pi/6)$

$$\cos(-17\pi/6) = \frac{-\sqrt{3}}{2}$$



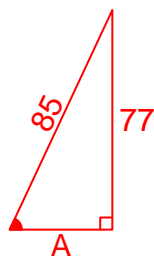
Find $\sin(15\pi/4)$

$$\sin(15\pi/4) = \frac{-\sqrt{2}}{2}$$

Question 3

If $\sin(\theta) = \frac{-77}{85}$, and θ is in quadrant IV, determine an exact value for $\tan(\theta)$.

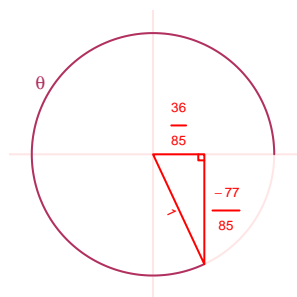
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$\begin{aligned}A^2 + 77^2 &= 85^2 \\A &= \sqrt{85^2 - 77^2} \\A &= 36\end{aligned}$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant IV in a unit circle.



$$\tan(\theta) = \frac{\frac{-77}{85}}{\frac{36}{85}} = \frac{-77}{36}$$

Question 4

A mass-spring system oscillates vertically with a midline at $y = 3.36$ meters, an amplitude of 7.57 meters, and a frequency of 8.8 Hz. At $t = 0$, the mass is at the midline and moving down. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = -7.57 \sin(2\pi 8.8t) + 3.36$$

or

$$y = -7.57 \sin(17.6\pi t) + 3.36$$

or

$$y = -7.57 \sin(55.29t) + 3.36$$